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# THE METHOD OF DEDUCTION AND ITS LIMITATIONS[1]

THERE are several logically recognized methods of arriving at knowledge. These may be classified broadly as the inductive, deductive, and speculative methods, all of which are in some sense interdependent. We are concerned here with the deductive or postulational method. This method operates on a higher level of thought than the descriptive method, a certain amount of finished knowledge being presupposed in order to begin in deduction. The essence of deduction consists in reasoning validly from premises to conclusions. In a larger sense, the systematic acceptance without proof of any principles to serve as premises for further reasoning is what is meant by deduction. It is thus clear that there is a deductive element in inducive reasoning, if the principle of uniformity is taken into account. A syllogism is an example of a simple deductive unit; and Euclidean geometry is a classical example of a deductive system. A deductive structure in which a few basic definitions and assumptions are explicitly laid down and from which all other propositions of the system follow logically is the ideal of completion toward which all disciplines strive. The deductive method, in this sense, is the most advanced and developed method in science, and has long been the ideal of philosophy. But the *final* justification of the premises is a further question, which goes beyond mere deduction. Deduction is not a self-sufficient method, since it must make use ultimately of such notions as truth, meaning, and reality, which are taken over from realms intrinsically more fundamental than formal science. Of the numerous problems which arise in connection with deductive reasoning the most important and essential question is that of consistency. It is therefore necessary to give an account of the nature of deduction in its formal and "material" aspects, in order to establish the locus of the problem of consistency. Most of the technical terms that are introduced are used as in the current literature of logical theory. The term "system" is used loosely unless stated otherwise. Thus a *domain* is a system of objects; a *substrate* (often called an "interpretation") is a system of objects with certain basic relations holding among them; and a *deductive system* is a system of propositions which may be derived from a set of propositions selected from it to serve as assump-

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tions. These principles, which name the essence of the theory and method of deduction, show both its strength and essential limitations. It is the thesis of this paper that it is possible to construct logic satisfactorily as a formal science and thus avoid paradoxes, but that the "material" presuppositions of formal thought deprive logic of self-sufficiency. It has long been recognized that there are logical limitations to metaphysics, and it is equally true that there are metaphysical limitations to logic.

## I

A deductive system consists of propositions in a concrete system, or of propositional functions in a system function. The unit of a concrete system is a proposition, which is an expression in symbols of a judgment. It is impossible to define a judgment without taking into account the system it implies. It may be stated that, generally speaking, judgments always occur in a context, or in the light of a system which is presupposed or co-judged. This is certainly true of all scientific propositions. It follows, then, that the adequate analysis of judgment is not possible without the study of the logic of systems, and since systems may be formal or material in character, the task of logical analysis must be a double one. A judgment is a meaning which may or may not be asserted, and which is directed toward an objectivity. Through judgment a totality is analysed, and one character is selected from the complex of characters which make up the totality. In other words, a system of possibilities is presupposed by a judgment. Such a system may be called a substrate. A more or less defined system is always basic to a judgment. This holds for such examples as "The tree is green," which presupposes the domain of nature, as well as for mathematical propositions. The limiting case of an individual judgment which may be expressed by a simple demonstrative may be neglected here, since it is of no significance for deduction. Furthermore, the assertion of a single judgment involves the negation of another judgment (the complementary judgment). It is thus clear that the adequate analysis of judgment can not be accomplished without involving the theory of deduction. Let us now turn to the concept of a system of judgments, which is prior to its constituent parts, or the single judgments.

A formal system consists of a set of connected propositions which may be represented by a set of postulates. Postulate sets are used in deductive reasoning in order to survey all possible deductions, or to enable us to survey the logical structure of propositions. This is done through the successive addition of postulates where needed. A comparatively small number of propositions stands for

a large system of propositions, in the usual case; and their deductive power must be equal to the whole system. The problem of deduction is thus reduced to a finite problem, which has pragmatic as well as theoretical value and significance. In arithmetic, for example, an infinite number of propositions is possible; but they may be represented by a finite postulate set which is potentially equal to the whole system. It is a further function of postulate sets to show that the propositions are connected and form a system.

It may then be asked whether every system is capable of formal statement; or, in other words, whether every system may be represented by a postulate set. The possibility of such representation may be proved in principle by making use of the concept of a well-ordered class as a construction. Suppose that a system consisting of a finite or infinite number of propositions is given, and let it be regarded as well ordered. The first proposition may be represented by $p_1$; and let $p_2$ be the first proposition not derivable formally from $p_1$; $p_3$ is, then, the first proposition not deducible from $p_1$ and $p_2$; etc. To put it generally (this may be done by transfinite induction): Let $p_r$ be the first proposition in a well-ordered system which may not be deduced from the preceding propositions $p_1$, $p_2$, $p_3$, . . . ; and there may be an infinite number of such propositions preceding it. In this manner the propositions up to $p_r$ form a subsystem—i.e., a subclass of the system of propositions, of which none is deducible from the propositions preceding it, and which are therefore non-deducible among themselves. This subsystem would then be the *basis* of the system or the postulates, and every other proposition could be deduced from them. It is obvious that there could be an infinite number of them. But is the nature of a system such that the propositions may be arranged in two classes, or those that are independent and those that are dependent? If the number of propositions in the basis is finite there is a last proposition, and so they could be proved independent. If the number is infinite, however, there is no last proposition. But it is true that every other proposition must be dependent upon the propositions selected as the basis. Otherwise there would have to be a first proposition which is independent, which would violate the principle of selection. Let the postulates in the basis be called $P$. If there is any proposition $q$ not included in $P$, it must follow all of the $p$'s; and it must not be non-deducible from them, for otherwise $q$ would belong to the series $P$. That is to say, if there were any propositions which were not deducible from the propositions of $P$, then one of them, $q$, would have to be the first of such a character. According to our construction, however, it must then belong to $P$, for it is held to be a non-deducible proposition. Therefore every proposition is derivable from the propositions of $P$, which must be finite if they are to be

deduced. This is illustrated by logical inference. The propositions belonging to $P$ are not deducible from one another in the general case; but in the usual examples of inference we mean that none of them is deducible from a finite number of other propositions. The extreme case in which $P$ may be equal to the system $S$ may be noted, that is, the case in which there may be as many postulates as there are propositions in the system.

It is thus clear that every system $S$ contains a subsystem $P$ which is such that all of the other propositions of $S$ may be deduced from $P$. No claim may be made to complete or absolute independence for the postulates, as the concept of a well-ordered system is presupposed; but it is reduced to somewhat more ultimate terms. In this manner the principle of a postulate set is introduced in the light of the whole system. Although $P$ is the basis of the system it is not complete in the same sense that $S$ is, for the deducible propositions are not contained explicitly in it. When those are added $S$ is obtained. $P$ is complete as a postulate set, but is not a complete system. In order to make it complete all of the other propositions of $S$ must be added.

It has been stated that postulate sets are usually finite. They must be finite if they are to be useful. But may there not be systems which are not representable by a finite number of postulates? Perhaps the possible system which comprises all possible postulate sets is an exception. The possibility of an infinite postulate set proves that an infinite number of propositions can not always be referred back to a finite set. This raises an interesting question, which we do no more than point out at this time.

By a formal system is meant a totality of propositions among which logical relations hold, which are consistent among themselves, and which are deducible in part from one another. There are subsystems from which all of the other propositions may be derived, and these partial systems, as we know them, may be finite. The domain of elements might also be finite, but there could be an infinite number of propositions about them (this is similar to the case of the letters of the alphabet). Thus there could be a finite number of elements in a domain of arithmetic, and a finite number of postulates. But the number of possible propositions would be infinite. Another case is that of the Boolean algebra of logic, with two or four elements, a small number of postulates, from five to ten in number, and an infinite number of propositions. Such a system is constituted by the propositions which are valid or "true" in it. If there is a postulate set, then those propositions which may be derived from it logically are valid. If, however, no postulate set is determined, or if there is an infinite number of postulates, the logically derived propositions are valid nevertheless. This presents

a more general standpoint, for a system does not have to be regarded as defined by postulates. "Belonging to a system" is a fundamental property, and that may be defined conceptually, so that a further criterion is not needed.

## II

The central problem of deduction may now be formulated. It is (*a*) to represent a situation described by a system of propositions by means of postulates which are consistent, which requires (*b*) the construction of logic so that paradoxes or contradictions are eliminated. Consistency is here to be distinguished from freedom from contradiction. By consistency is meant the realisation of a system in a field of objects; whereas contradictions may occur *formally* in the deductions of a system. Contradictions can occur only in the same system, it must be emphasized. Propositions do not contradict one another by themselves (in fact, they can not be "by themselves"); they may do so only when applied to the same system. On the other hand, two propositions are *consistent* when there is a substrate in which both of them may be realised. Two propositions for which that is impossible are called inconsistent, with respect to a given system. Consistency is thus the goal and the essential thing, and not "freedom from contradiction," which is usually stressed and which is purely formal. We may not be able to exhibit the necessary substrate. In that case the question is merely undecided. A substrate must itself be free from contradiction. If a contradiction can be shown to occur in the assumptions of a substrate we know that the system which may be realised in it is inconsistent. But if that can not be done, nor a substrate be exhibited, the matter is simply undecided. It is not yet known whether Peano's postulates for arithmetic are consistent. A possible proof on the basis of Sheffer's logical analysis that contradictions can not be deduced would not prove that there is a substrate. What a substrate for Peano's postulates would look like presents a very difficult problem.

A substrate is a domain of objects or "things" in which a set of basic relations is "definite"—i.e., is determined with respect to the principles of contradiction and excluded middle, so that every relation *Rxyz*, etc., holds or does not hold. All relations which can be derived logically from them by composition, as conjunction, disjunction, etc., are also determined. That is to say, the basic and the derived relations are definite. The principle of excluded middle is of fundamental importance for the principle of substrates; it enters into their definition. If a complete postulate set is realised in a substrate, even in a conceived or thought substrate, then so are all of the propositions that can be derived from it. In order to

realise a system, therefore, one needs only to realise a complete postulate set, which means that it is complete for a given system, whether finite or infinite.

In the construction of a system, classes, or relations with one variable are taken to designate a domain of objects. It is better to speak of a domain to begin with, classes being always formed *within* a domain, in the schematism of a deductive system. Therefore, in describing the fundamental concepts of a system, we should speak of a domain of objects and relations, which are followed by the postulates and theorems. In order to show that the postulates are consistent, substrates must be possible for their realisation. A simple illustration of a substrate in formal science may be given. Take the two elements 0 and 1, connected by the two basic relations "plus" and "times." Every equation between the elements may then be determined, as follows: $0+0=0$; $0+1=1+0=1$; $1+1=0$; $0\times 0=0\times 1=1\times 0=0$; $1\times 1=1$. This is an example of a mathematical substrate because every equation of the form $x+y=z$, and every equation of the form $x\times y=z$ is decided in the system—i.e., holds or does not hold, if $x$, $y$, and $z$ equal 0 or 1. Further propositions can be derived from the basic propositions, which may be regarded as independent assumptions, through combining them by addition, etc. A postulate set may then be realised in this substrate through interpretation. The equation $y=z+1$, which expresses the relation of "successor," involves infinitely many basic relations, since for every number $z$ there is a number $y$ such that $y=z+1$. These form a system which is consistent or inconsistent. The principle of excluded middle does not have to hold in every system, as is shown by the existence of incomplete systems, but it must hold in a substrate. This principle is the goal and not the presupposition of a formal system, an order of procedure which is illustrated by mathematical reasoning. Furthermore, since the principle of contradiction also enters into the definition of substrates, a formal system may be proved consistent if by the addition of further propositions, which may be infinite in number, it can be made to be a substrate. Thus a substrate may contain more propositions than the system, for propositions may be added to the system.

Substrates may be regarded as more or less ordered domains of objects, a domain being a minimally ordered substrate. A domain consists of elements which have in common only the fact that certain propositional functions are meaningful in it. If "$x$ is green" is asserted, $x$ must be a colored object, the domain in this case being, for example, "visual objects." The propositional function "$x$ is mortal" refers to organisms as the domain. The "original" domains are not classes, because they are not defined by propositional

functions; nor are they definable by them, since they form the foundation for propositional functions. The objects of domains are the objects of possible propositions, "objects" being construed in a most general sense. Classes may be separated out by propositional functions, so that the elements for which a propositional function is true belong to a class. The classes are thus subdomains, the domains being posited as original and the classes being derived. Since all mathematical propositions are based on propositional functions they presuppose domains. The domains have a formal significance in mathematics, and do not have to be founded factually. In such domains there are relations with any number of variables which yield true propositions for some complexes and false propositions for other complexes—complexes, that is to say, of one, two, three or more elements, according to the nature of the relations.

Substrates interest us particularly when they satisfy a postulate set, but they do not have to presuppose postulate sets—i.e., they are not bound up uniquely with any particular postulate sets. A postulate set first has meaning in the sense of objective reference when it refers to substrates which satisfy it. A postulate set may indeed have meaning by itself, in the sense of formal meaning or form without content, but it can have no objective meaning without substrates. On the other hand, a substrate has such meaning by itself. As has been stated, the consistency of a system is established by its realisation in a substrate. If no substrate is shown to realise a system the question concerning its consistency is open. In that case the system is not known to be significant or fruitful.

It might be suggested that the impossibility of realisation in a substrate can be inferred from the presence of a contradiction in a system. In other words, could a substrate realise a self-contradictory system? This question leads to the root of the general concept of consistency, which is based on the principle of "positing" domains and substrates for which the principle of contradiction must hold. It follows, therefore, that contradictions can not be realised in a substrate. Applied to the possible substrate of the real world, this amounts to the metaphysical assumption that reality is free from contradiction. If this assumption is made, a real basis for consistency is given therewith, for it can be used for the realisation of postulate sets. Nevertheless this presents an acute problem in mathematics alone in the case of infinite domains. The existence of an infinite domain is a presupposition which is at the basis of arithmetic; and it is assumed that such an aggregate is free from contradiction.[2] As far as our present knowledge is concerned we must speak

[2] *Cf.* Russell, *Introduction to Mathematical Philosophy*, p. 77, in which he states that there is no evidence for the existence of infinite collections, but that neither is it impossible that they exist. The assumption that there are infinite collections in the world is called the "axiom of infinity."

of such domains as "posited." But we may hold a system to be free from contradiction without positing it; or we may posit it without knowing that it is free from contradiction. In formal science "existence" means a property within a system, the property of "being posited" or positionality. In arithmetic the numbers arise in this manner, and have no existence but that *in* the system. When we set up a postulate set we posit a substrate which satisfies it and which has existence only in that system. The concept of existence may not be referred back to that of freedom from contradiction; we can only say that the freedom from contradiction has been presupposed. Only finite domains can be displayed empirically. Hence no arithmetic is possible as an infinite system without ideal positing. The problem is not solved by demonstrating the realisation of one mathematical system in terms of another, as Hilbert has done, for the latter is itself positional in character. The expression "there is" in mathematics usually means that one draws on the traditionally accepted analysis and makes use of former assumptions.

In mathematics the assumption of transfinite domains is as unavoidable as it is ultimate. The concept of a limit in modern analysis involves the idea of infinity as an unlimited process, which, however, presupposes a real infinite. If there were only a finite domain of numbers no number could grow without limit, so that actual infinites must be presupposed, within which unlimited growth or diminution can occur. Consider the case of $1/n$ as $n$ approaches infinity, or suppose that $n$ be allowed to grow so that $1/n$ is smaller than any number. If there were a largest $n$, then $1/n$ could not be diminished without limit. Therefore the latter concept presupposes an actual infinite, in order to give the process meaning. This is the best and most natural foundation for an actual infinite domain. It may be said that every mathematical proposition which is not trivial refers in the last analysis to infinite domains. Mathematics, in this sense, is the doctrine of infinity. We construct one system of arithmetic on the basis of an unlimited number series, without exceptions, and from which all properties of finite systems can be derived. It then has scientific character. Infinite domains are only given through special assumptions and can not be realised adequately.

## III

Freedom from contradiction is an essential requirement of logic, which makes necessary the elimination of the alleged paradoxes of logic. It can be shown that they may be disposed of in the light of the theory of deduction that has been sketched. The term "antinomy" should be used to refer to propositions that are apparently contradictory—i.e., to apparent contradictions of fundamental logi-

cal principles. The term also implies that we are not yet clear about them. Consider, for example, Russell's antinomy of the class of all classes which do not include themselves.[3] To which class does that belong? It can not be a member of itself; nor can it exclude itself. Zermelo, in his "Grundlagen der Mengenlehre,"[4] set himself the problem of so constructing the theory of classes that such contradictions will not occur. He argues that classes should never be defined "independently," but always in a domain in which they have meaning. The domain may be the class of all classes, but it is not a class itself; and it should not be confused with its elements, which are classes in this case. The domain is divided into two *parts* by means of the character "classes not including themselves," and these parts do not belong to the domain as elements, for they are not classes. By means of the principle that "Every class $M$ has at least one subclass $M'$ which is not an element of $M$" Russell's antinomy is obviated.

Since such paradoxes arise because of inadequate technical analysis or because of confusion concerning the fundamental concepts of logic, it is possible to free logic from them by a thoroughgoing examination of its foundations. It is thus possible to construct logic satisfactorily as a deductive structure. Important though that be as a formal achievement, we are more interested in the application of logic to the real world, which does in fact exemplify logical relations and structures. Mathematics and mathematical logic are studies of the structure of systems, whereas other sciences, such as physics, are interested primarily in their content, the nature of the facts being essential. Mathematics deals with invariant structures and ideal entities, which presuppose infinite domains. But in reality there are no such general objects as lines, points, etc., any more than there are abstract cows; and all transfinite domains are hypothetical in character. Thus it appears that in formal logic we are doubly removed from the world of experience. For, firstly, there are the limitations of the deductive method which are set by the operation of "positing," since postulates as formal structures must be realised in a field of objects which are never "given" except in finite situations; and secondly, the so-called world of nature is itself a construction, with its own peculiar assumptions of transcendence and objectivity.

In order to explain the world of experience it seems necessary to introduce principles which transcend it, and therefore logic must posit infinite domains which are free from contradiction. This is as vitally basic to the method of deduction as the principle of the uniformity of nature is to the method of induction. This principle

[3] *Cf.* Whitehead and Russell, *Principia Mathematica*, Vol. 1, p. 63, 1st ed.
[4] *Mathematische Annalen*, 1908.

is also important as a regulative idea, and is useful in the development of deductive method. But nothing follows from it metaphysically, except possibly a provisional philosophy of pluralism, corresponding to the multiplicity of domains. A monistic theory could only be set up if the invariant of all possible domains could be established and described by the invariant of all possible systems. It is to be doubted whether this is possible as a formal or technical feat, let alone as a theory of reality. This view is opposed to the standpoint of Bradley, who analyzes judgment as such as a characterisation of one "Reality," which is assumed as the domain.[5] Even granting that to be the goal it must be recognized that it is still a problem, and quite an open one.

The material assumptions of logic may be viewed in the light of the concept of *transcendence*. All reaching out beyond the immediate specious present furnishes examples of transcendence. The theory of the infinitude of space and time is a further extension of this insight, the factual basis for such transcendence being found in the characters of retention (retaining from the past), protention (anticipating the future), and presupposition (involving a field of objects), which are attached to all experience. Our beliefs in the continued or permanent existence of a real world, or even in its independent existence, are examples of such material assumptions of transcendence. In actual practice we exercise "animal faith" in the independent existence of nature, and, in our logical thinking, we have "rational faith" in the existence of trans-experiential domains, as also in the absolute validity of the logical processes of inference. All beliefs in the existence of fixed domains or of "eternal" objects are cases of rational faith. It is true that the assumption of animal faith "works" for empirical life. Does the assumption of rational faith work similarly for the rational life? It does not in its entirety, for, although it furnishes us with the permanence we desire as a principle of explanation, we also desire adequate proof of all principles. In other words, the demands of reason are greater than those of practice. This is a difficulty resulting from the logical situation involved by the speculative or dogmatic assertion of existence. The claims that necessity, permanence, etc., are established by means of essential analysis or insight are not verifiable empirically; and any other kind of rational, non-temporal verification does not suffice for a temporal world.

A final word may be said about the error of the "self-sufficiency" of propositions and hence of logic. A proposition without its indication or objective meaning is an abstraction, a purely formal

[5] *Cf.* Bradley, *Principles of Logic*, Vol. 1, 2nd ed., for his discussion of the laws of identity, contradiction, and excluded middle, in which a monistic view is imposed on the structure of logic.

structure. Its minimal indication would be itself as a symbol. The formal knowledge resulting from such an analysis is very thin indeed, and gives no guarantee whatsoever of objective reality, which must be distinguished from it in principle. This error has been committed by idealism, for example, by Husserl in his use of the phenomenological method, which deals with events of pure consciousness. The meaningful judgments of pure consciousness are treated by themselves, and the objective world is then regarded as their correlate. If by pure consciousness *actual* consciousness is meant, then the world is a limited world of actual correlates and requires the usual material assumptions in order to make possible the foundation of science and knowledge. That is, if it is to yield more than mere self-knowledge. It must even then be observed that the phenomenologist has had the advantage of observing an external world to begin with. The advantages of the alleged absolute certainty of the materials of pure consciousness and the claim of this method to enable us to begin presuppositionlessly are given up therewith. It is unnecessary to point out that the assumption of an absolute consciousness merely adds one more difficulty to the problem. That we can not reason without making assumptions may be called the "logic-centric predicament." It must be emphasized, however, that no metaphysical capital should be made out of what is virtually a predicament. Logic must make assumptions, both formal and material, and the latter may be treated as regulative ideas which are either gradually verified or modified in experience. More than that can not be said if we are not to leave the world of facts for one of fancy.

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## THE DEFINITION OF YELLOW AND OF GOOD

PRIOR to all specific questions of ethical philosophy is the question whether there can be an ethical philosophy at all, whether the subject-matter of ethics is in its nature susceptible of scientific or systematic treatment. The threat to isolate ethics from the natural world of fact and concept takes various related forms. An easy and familiar one is the denial that "the *ought* can be derived from the *is*." This I am here not immediately concerned with. Another form is the assertion that good, the object of ethical inquiry, is "an ultimate simple quality," "unanalyzable," *sui generis*, and indefinable. I believe that the question here involved still represents a living issue for philosophy, and I propose to examine it, and with it something of the question of the definability of qualities in general, with especial reference to the program of naturalism and naturalistic and realistic ethics.

The standard citation for the indefinability of the predicate good is to Mr. G. E. Moore's *Principia Ethica*. According to this view, the character good is a simple ineffable quality "like the color yellow." The implication of this view is that such a quality, somehow recognizable in the raw immediate experience of its instances, is indefinable, and not to be analyzed or translated to conceptual generalization or systematized in a natural science. Although Mr. Moore, for example, really permits himself rather more ratiocination on the topic than the statement of this principle seems to warrant, he tries to limit his ethical study to an unassuming inventory of the things which present this ineffable quality.

One proposed method of meeting this objection is to deny that good is anything so crass as a mere quality.[1] For the purposes of this paper, however, I shall maintain what is to me obvious, that the good, as experienced at least, is, or has, a quality. And just this general question of the relation of qualities to their conceptual determination and definition will bear the brunt of my argument. I shall first examine briefly the extent to which any simple experienced quality, yellow, for instance, is really unamenable to definition and adequate scientific and conceptual treatment. Then I shall subject the quality good to a parallel examination. I think that it will appear that the quality yellow can be and actually is being as satisfactorily and systematically defined as anything possibly could be which is not itself a mere definition (as some logical entities may be). I think that it will appear, too, that there is good reason to believe that the quality good is capable of essentially the same scientific modes of definition. If good does offer discouraging difficulties to philosophical formulation, these difficulties do not occur in those points where it is a "simple quality like yellow," but where it is conceptually or scientifically more complex.

Although the foregoing will indicate that I take my text and point of departure from a famous doctrine of a famous work, my remarks are primarily intended, not to display any truculence toward Mr. Moore or anybody else, but rather as what I hope is a constructive suggestion for the ethics of naturalism and realism.

Now, there is one fundamental and inescapable peculiarity of conscious experience which can account in large measure for the plausibility of the doctrine of indefinables. This peculiarity will be referred to below as part of the difficulty of the problem of the relation of experienced qualities to their "objective physical conditions." It is connected ambiguously with the problems of unity and multiplicity, "whole and part," and primary and secondary qualities. Without trying to solve these problems, we can name the

[1] J. Solomons, "Is the Conception of 'Good' Indefinable?" *Proceedings of the Aristotelian Society*, 1905–1906.

peculiarity very broadly, thus: every article or complex in our conscious experience does have a sort of sensuous and unique whole-aspect, appears as an immediate *quale*, sensum, datum. Geometrical shapes as experienced have this total "raw feel."[2] James and some of his successors have remarked on "the integral aspect," not only of triangularity and rotundity, for instance, but also of objects whose apprehension the traditional psychology declares to be far more complex: the tragic, the comic, the wholesome, the horrible, and so on. Qualitative immediacies of the foregoing sorts can be analyzed directly within experience. They are experientially complex. On the other hand, so-called "simple qualities," such as yellow, are those which can not be analyzed directly within experience. They appear, that is, to possess only the whole-aspect, and are customarily analyzed and explained indirectly, by reference to more or less hypothetical constituents or correlates.

Everything in heaven or on earth, at least as it comes to consciousness, can have this total mass, this sensuous qualitative integrity. Concerning the experienced *quale* as just this unitary datum (whatever may be its relations to its apparent parts, and whether our epistemology decides it is an integral whole-aspect of a real physical structure, or only an idea or essence correlated with a structure which is itself unexperienced) almost nothing can be said. The slightest attempt to analyze the most complex of such presentations mars its glassy surface, changes it to something else. The ratiocination and symbolization of the philosopher must be still more ruinous of its pristine, perfect flavor.

I shall claim, therefore, that an analytical and definitive science is inevitably inadequate to the only world which we experience, if we demand, for its adequacy, that its analyses embalm and contain the whole sensuous tang of their object. The formula for yellowness can not be yellow, nor can the formula for goodness reek with the very incense of the good. The formulæ of science are a peculiarly abstract and colorless sort of symbolic transliteration; herein consists their value. On the other hand, I believe, just because this predicament is universal, it may be abstracted from. It justifies no invidious exceptions in behalf of the qualities yellow and good, and it is cancelled out, as an objection to the scientific program either of physics or of ethics, by the obvious fact of the success and relevance of science in its dealings with the world, however indirect our ultimate theory may assert these dealings to be.

These elementary stipulations really contain the kernel of my argument. On the grounds thus adopted, the following pages will attempt a more precise explication, and an appraisal of the special

[2] I borrow an expressive phrase of Professor E. C. Tolman.

difficulties supposedly inherent in the definition of the qualities yellow and good.

Now, it is not entirely clear just what definition shall consist in. To define an entity to someone may mean simply to make him understand what it is, so that he knows what you mean when you mention it. It is doubtful if anyone seriously asserts that the quality good is impossible of this sort of definition. The important sense of "definition," and the one intended here, consists in an articulation of the matter defined with the body of conceptual and experimental knowledge.

In order to cover a maximum of ground at the expense of a minimum of verbiage, we may accept a valuable schema for an inquiry regarding definition from Mr. W. E. Johnson's *Logic*.[3] First, primarily of *words,* he recognizes (1) "ostensive definition" and (2) "bi-verbal definition."[4]

(1) Ostensive definition consists in an introduction of the object itself, with the pronunciation of its name so that the connection is recognized by the person to benefit from the definition. "Yellow" surely has no peculiar incapacity for this kind of definition.

(2) Bi-verbal definition consists in a statement that a certain word or set of words is to be used as an equivalent for another. Its formula is "$x$ means what is meant by $y$." To take our example, "yellow" means what is meant by "*gelb*," "*jaune*," "the color between orange and green;" "lemon," "topaz," "saffron," "straw," "primrose," "chrome," "gold," "ochre." (That our language is here comparatively poor in exact synonyms is quite fortuitous and unimportant to our purpose.) Both ostensive definition and bi-verbal definition are admittedly of the sort designed chiefly to make one's interlocutor aware of what one is talking about, and are primarily applicable only to words, as words, but in so far as a science is only *une langue bien faite,* philosophical importance belongs even to these varieties of definition.

Scientifically more significant, however, are (3) synthetic definition, and (4) analytic definition.

(3) "In synthetic definition we exhibit the nature of what is simple, not by representing it as a complex, but by bringing it into synthetic connection in a complex of which it is a component."[5] It is plain that the color yellow is capable of this definition. One may define yellow by its position in the color-pyramid, by its actinic and psychological properties, or by the general conditions of its occurrence in nature or art. There not only could be, but is, an extensive and successful science of yellow, defining it synthetically

[3] W. E. Johnson, *Logic,* Pt. I, Cambridge, 1921.

[4] *Op. cit.,* esp. pp. 94 and 90.

[5] *Op. cit.,* p. 108.

by ascribing the laws of its appearances and effects, where one may expect to find it, how one is to make it, and what one can do with it. In fact, the status of the color yellow is quite like that of any other feature of the experienced world which science essays to define, describe, and explain, and it happens particularly that in just this sphere of light and color, science has been signally successful in laying bare a rigid and rational system of truth.

(4) "In analytic definition we pass from an unanalyzed—i.e., an apparently simple—to an analyzed equivalent."[6] Mr. Johnson does not believe that analysis is essential to definition, and claims the synthetic nature of the definition of the symbolic entities in logical and mathematical systems, that realm of definition and of conceptual order *par excellence,* in his support. And that the scientific demands on the process of definition, and especially the demand for the definition of yellow, can be beautifully satisfied by synthetic definition, I have indicated in the preceding paragraph. But if there is any justification for the contention of the indefinability of a "bare quality like yellow or good," it must rest in the assumption of its unanalyzability.

Here we are face to face with the fact, which was anticipated in the preliminary discussion, that the name of a quality, such as "yellow," is employed with such an ambiguity that it is singularly difficult to come to grips with the realities involved in a question of the quality's definition. Assuming that by "yellow" we do not mean merely the *word,* one can still inquire whether we mean the psychic process of the color's apprehension, the "physical correlates" of this apprehension (i.e., its conditions in the physical object, if there is any), the "physiological correlates" (its conditions in the perceiving organism, if there is any), the relations of any two or all of these sets of conditions, or the bare *quale* or "essence" which is the quality itself. Indeed, this question merges inevitably with the vexing philosophical or scientific question of the status of experienced qualities, which is integral with the cardinal metaphysical and epistemological problems of the relation of mind and body and of mind and its object.

Without a definite answer to these questions, it is far from certain that there is any sense at all in which even the color yellow is even analytically indefinable, and it is my purpose to assert that if it is indefinable in any sense, it is in one which has no real mundane significance and one which is not peculiar to yellow. The world of which we are aware is composed *in toto* of qualities, and if the analyses which constitute the sciences are relevant to and descriptive of this world, they are in some unimpugnably valid sense analyses, direct or indirect, of "simple qualities like yellow." It is hardly

[6] *Op. cit.,* p. 108.

conceivable, whatever one's metaphysical predilections, that a higher degree of scientific relevance can anywhere be demanded or supplied.

If we grant the opinion of Professor Holt and Professor Alexander, for instance, that the experienced color yellow is *identical* with what are usually termed its "physical correlates" (the opinion which, on the whole, I should incline to adopt), or that of Mr. Russell, that the color is identical with what are termed its "physiological correlates" (this is at least one way of interpreting his current doctrine, as it appears in *Philosophy* and *The Analysis of Matter*), we grant thereby that the physicist's analyses of matter and of energy, down to the latest chronogeometries of the relativists, are nothing more or less than very complete and systematic analyses, or analytic definitions, of such facts as the color yellow, and that there is already a very great deal known about the analysis of this simple fact in particular.

Now, it happens that those who deny the definability of "simple qualities such as the color yellow" are likely to be subscribers to a highly special doctrine of the status of qualities—the "sensa" or "essence" theory, by which the *qualia* are simply the bare adjectival identities which they are presented as, all of a piece, spaceless, timeless universals.[7] This theory need not be argued here. Suffice it that it, too, gives to yellow the same status it gives to all the other content of experience, and at the logical extreme to which Mr. Santayana, e.g., develops it, it must deny that even the apparently most complex presentation can truly be analyzed. (For the complex is all one essence, and a different essence from those constituting the result of the analysis.) And all these essences, at any rate, the theory holds to be impotent epiphenomena, effective only as "signs" to conscious creatures. This means that they are rationally rooted and inevitable epiphenomena, which can serve as intelligible indications of the physical, divisible, measurable entities with which they are universally and uniformly "correlated." The scientific consequence of this theory, then, is once more a virtual identification of the *quale* and its correlates. If one stands fast to the letter of the doctrine, nothing in the world of experience is any better analyzable and definable than a simple color-quality like yellow; while if one admits that in scientific practice, the things of experience (all of which are sensa or essences, by the theory) are indirectly but infallibly analyzable and definable in terms of their correlates, then this capacity belongs *a fortiori* to so familiar and simple a fact as the color yellow.

The reader will easily see the extent to which parallel considera-

[7] If the details of this characterization of a doctrine with so many varieties and ramifications were more relevant to the discussion, it would need some modification. I neglect the polemic issues involved.

tions apply to the opinion that an experienced color is purely an article of psychic content. If the color "yellow" is only psychic, so is every element in the experienced world, and for all practical and all scientific purposes we must proceed by identifying the color with those systematic "physical correlates" (whatever their ultimate metaphysical status) which alone allow us to understand and control them. I shall not complicate the argument by trying to take advantage of the theory of "psychic elements," according to which purely psychic data are analyzable in their own right.

(5) In all of this, it may be asked, what has become of that definition *per genus et differentiam,* which is the only kind that many of the school-room logics testify to? As a mode of definition, it is only fleetingly mentioned by Mr. Johnson,[8] who relegates it principally to his doctrine of classification, in his chapter on the determinable.[9]

Now, Mr. Johnson remarks that this traditional mode of definition is devised chiefly to deal with substantives and not with adjectives. It might be said, therefore, that the quality yellow is, in this regard, neither definable nor indefinable, since it is an instrument and not an object of definition. By its indefinability here, however, may be meant that yellow is one of the multitude of those simplest adjectives into which can be resolved the indefinite number of complex adjectives (let us say, for example, the character which constitutes being a yellow-and-fragrant flower) which characterize the indefinite number of "places" in a classificatory scheme; and that these simple adjectives themselves are an eternal arbitrary number, disjunct and incommensurable.

I can scarcely conceive the possibility of the world's comprising such arbitrary and fragmentary ingredients. At any rate, it is empirically plain that the world does not comprise them. A large part of physical and physiological science consists in a rational ordering of just these apparently simple qualities, an ordering which depends upon equating them with a rigid system of complex conditions or correlates. So far as the classificatory process, and definition *per genus et differentiam,* survives at all as an aim of modern science, the process owes its importance to an empirically justified assurance that certain such schematizations represent, or will assist in discovering, a "real" structural relationship and continuity of the defining

[8] *Op. cit.,* p. 103. In adopting Mr. Johnson's scheme to assist this discussion, I in no wise mean to imply that Mr. Johnson would agree with my argument or conclusions. Indeed, he says, for instance: "Ultimately a simple adjective-name—such as red—cannot be defined analytically but only ostensively." (*Op. cit.,* p. 94.) If he intends this as a finished and metaphysically significant thesis (which I doubt), he incurs the general criticism which these pages are designed to afford.

[9] *Op. cit.,* Chap. XI, pp. 173–185.

adjectives. That is, the schematizations are designed to epitomize the kind of order and commensurability which we have treated of as providing synthetic and analytic definitions.

That a simple quality like the color yellow is definable and susceptible to scientific treatment in the only senses in which a scientist can legitimately be interested in defining it, I consider to be established by the foregoing. The only peculiar question involved is that of the status of qualities in the natural world, and this is not peculiar to yellow. Now, the persons who deny the definability of the quality good have compared it to the quality yellow because they thought the *indefinability* of the latter was especially obvious. I have treated first of the quality yellow from directly the contrary opinion, namely, that in some respects the *definability* of the quality yellow is especially obvious. I agree, however, that the task of the definition of the quality good is probably essentially the same sort of task as that of the definition of the quality yellow. I shall rapidly indicate, therefore, the directions in which the methods and conclusions of the preceding paragraphs are applicable to the definition of the quality good.

(1) That the quality good is susceptible of ostensive definition, that it can be recognized and pointed out, is something of which many of the opponents of naturalism are most certain. This particular certitude I consider hardly justified by human experience, but the sensuous immediate recognizability of an entity has little to do with its systematic status in a science, one way or the other.

(2) A bi-verbal definition of "good" may be a trivial translation into other words ("*gut*," "*bon*," "ethically or axiologically positive") or a more or less important resolve to use the word always in a certain systematic context, to mean the same as certain other combinations of words. Since such a resolve would usually be motivated by an experimental conviction that such a scheme best fits the world, it may verge on a respectable ethical or metaphysical theory.

(3) The synthetic definition of the quality good, in so far as it is other than the verbal resolve just touched on, is a large part of that very difficult science of the good whose attempt I would justify. Even though we now lack a final solution of that science's problems, so long as we grant the empirical recognizability of such a quality as good, we can hardly escape acknowledging the theoretical practicability, cognate with that of the other enterprises of science, of a discipline which would determine the conditions of the quality's occurrence, its relation to other qualities, its relations to natural processes, what it does, and how it is made. The science of color can teach us how to make things yellow (for instance). The science

of morality will make a solid and admirable contribution when it can teach us how to make things good. Unfortunately, the quality good, instead of being precisely like the color yellow in respect of this amenability to scientific treatment, promises to be somewhat more recalcitrant and recondite. This difficulty, however, affords no reason at all to doubt the quality's essential susceptibility to the treatment as such.

(4) Subject to the same conditions which complicate the question of the analysis of any experienced quality, as I have noted them in regard to the analysis of the color yellow, it is *prima facie* entirely practicable to devise an analysis, and so an analytic definition, of the quality good. This likewise is a large share of the task of the moot science of ethics itself. My own opinion is that of late years a great deal of valuable work has been done toward this analysis. Certainly no important evidence has appeared to justify the denial to the quality good that natural status, consisting either in inevitable correlation with or in identity with certain natural physical structures, which is ascribed, for instance, to the color yellow. And these interior structures discovered for good, like the structures discovered for yellow, must be continuous and articulated with, and explain and be explained by, that ulterior structure, that system of situations and conditions, which was considered under the topic of synthetic definition. We must notice, however, that in supposing that the quality good will prove to be experientially simple "like the quality yellow," we are doing considerable violence to the appearances, for the sake of an extreme instance. It is quite likely that the quality good may prove to be the whole-*quale* of a structure whose significant elements are immediately discernible in experience, so that resort to unexperiencible constituents or correlates will be unnecessary for its definition and analysis. In this sense only are experientially complex qualities more readily analyzable than experientially simple qualities.

(5) Good, like yellow, is an adjective, and hardly amenable to the traditional method of definition *per genus et differentiam*. We have already found our warrant, however, for assuming that good, like yellow, can inalienably own a rational and assignable place in the system of adjectives defining a scientific scheme of classification. This place would be determined by, and be important because of, the investigations touched on in the foregoing paragraphs.

I conclude, therefore, that the apparent simple qualitative aspect of the quality good does not at all justify a suspicion that it is not a factual character in the natural world, or that it can not be studied as practically and systematically as the quality yellow, or the quality of a vertebrate, or that of an electro-magnet. Cer-

tainly, whatever difficulties confront this program are not the aspects in which the quality good is *like* the quality yellow. With the differences between the quality good and the quality "yellow" (which are no doubt considerable) we are here concerned only enough to remark how plausible it is that they shall prove to be of the sort familiar to science, i.e., a function of natural complexity or abstractness, and how incredible that they shall prove to be of a sort to affect adversely the essential capacity of the quality good for rational investigation. To suppose that the quality good has not such a status, that it, unlike any other quality in the world, is an incalculable surd, an anchorless will-o'-the-wisp, without conditions or correlates, is an arbitrary assumption of the irrationality of the universe in just that region which philosophers, from Plato to the present day, have generally regarded as most constant, systematic, and intelligible.

In a paragraph or two, it may be worth while to consider illustratively some directions which the analysis of the good could take. Let us suppose, for the sake of easy exposition, then, that we have decided that there really exist physical organisms in a physical environment. There remains an epistemological or metaphysical problem, whether the quality yellow or the quality good *as experienced* is numerically identical with or only symbolic of those objective conditions which every experience and analogy assert that they must have. It may conceivably be decided that the "raw feel" of either quality depends upon factors which are contributed by the experiential processes of the conscious organism. In this case, we might ordinarily say that the conscious quality yellow is correlated with or symbolic of, let us say, a certain definable energy-pattern, either in the organism, or in the object, or in both. We might also, by metonymy, call this energy-pattern itself "yellow." The definition of yellow in either context, physical or physiological, or in both contexts together, would be instructive and valuable.

With the conscious quality good, we have the same epistemological problem: i.e., it may prove that when I perceive an instance of good, the raw feel is only correlated with and symbolic of the object of my perception. But at this stage a further relativity suggests itself, and may make the status of the good a more complicated inquiry than that of yellow. It is conceivable, and is implied by the doctrines of certain realistic philosophers, that the locus of the quality good is "objective" in the same way as that of yellow; i.e., that the experienced quality good has no dependence upon any of the processes of the organisms which are concerned with it, except (perhaps) for certain essentially irrelevant aberrations contributed to the conscious report of it by the operations incidental to its per-

ception. On the other hand, it is conceivable, and is implied by the doctrines of certain other realistic philosophers, that, even in abstraction from the ubiquitous relativity of the perceptual process, it will prove impossible to define the quality good save with further reference to a living organism and to some activity of that organism which somehow is a constitutive factor in the quality—such activity, e.g., as "interest" or desire.[10] If this is finally found to be the fact, the scientific objectivity of the quality good will be no more destroyed by it than the objectivity of the simple phenomena of gravitation or of metabolism is destroyed by the impossibility of ascribing either of them to a single object in isolation.

Either mode of definition would assure to the quality good a definable structure and a systematic place in the world of nature, and we need not be further concerned with them in this paper. But if the definition of value as simply the character of being the object of an interest *is* the last word in the matter, it must be because there is no common character to be discovered *intrinsic* to all the objects which engage the interests of organisms. I shall not argue whether this is probable. Some ethical philosophers, however, hold that desire is the organ by which men perceive an objective and independent quality good, just as sight is the organ by which they perceive an objective and independent color yellow. Now, if, as a matter of fact, the whole goodness of an object really consists in, or persistently appears to consist in, its being an object of desire, and there is really no further and intrinsic common character to be found among objects of desire, it must infallibly appear to persons of the above persuasion that there really is nothing at all common to good objects except their sheer goodness. This might easily be one source of the conviction of the indefinability of the good; but, by hypothesis, it rests wholly on a prior imperfect and prematurely adopted theory of the locus of the quality in question, and of the mode in which we apprehend it.

The fact of the universal correlation, or identity, of qualities with their systematically definable "substrata," which science is compelled to assume, largely vitiates not only the version of the doctrine of the indefinability of the good which we have noted, but also an attack upon naturalistic and empirical ethics which is made by the German phenomenologists, notably Scheler.[11] Scheler con-

[10] The best known opinion of this sort is Professor R. B. Perry's: *The Moral Economy; General Theory of Value.* For the distinction, touched on above, between the possible relativity of judgments or perceptions of value, and the possible relativity of the situation which constitutes value, see the latter work, Chap. V, sec. ii, pp. 127–140. Cf., also, pp. 357–368.

[11] Max Scheler: *Der Formalismus in der Ethik und die materiale Wertethik,* 1916.

tends that the whole of ethics is accessible by means of an intuition of the essences of the sundry varieties of value, with which is given immediately an *a priori* intuition of the relative dignity of these varieties. In America, this kind of doctrine has been employed to criticize the empirical biological theory of value of Professor Perry, for example.

Now, like Mr. Moore, Scheler is fond of analogies from the color qualities, whose ultimate nature and relations he thinks can be intuited *a priori* by inspection of the essences. Yet it is obvious that the order and properties of the color qualities have a ground in the mathematical order of their "physical correlates," and that these latter are most profitably accessible to empirical study. Indeed, no *scientist* dreams of finding important truths about colors and their relations by simply intuiting their essences. By every analogy, and in default of an incredible and arbitrary discontinuity, we must assume that the same is true, *mutatis mutandis,* of the quality good. Granting that the good has a unitary and essential *quale,* or variously subordinated sets of *qualia,* we must deem it more likely that important, systematic, and scientific truths about the good will be discovered by the empirical, naturalistic, analytic method, than by the *a priori Wesenserschauung,* or intuition of raw essences.

In this paper I have examined the familiar proposition that a naturalistic ethics is impossible because good, which is the object of ethical study, is a simple and ultimate quality like yellow, and because all simple ultimate qualities are indefinable and unanalyzable and so incapable of conceptual treatment. In reply, I have tried to show, first, that even a typical "simple quality" such as yellow is in truth *not* indefinable, unanalyzable, or unexplainable, in the principal and legitimate senses in which the scientist or philosopher can have any object in defining and explaining it. So, in the second place, I have indicated the likelihood that the quality good, even should it turn out really to be "simple, like yellow" (which is far from a foregone conclusion), must be in principle no less definable, analyzable, and explainable, in essentially the same ways and with the same success and significance, as the quality yellow.

The fact that goodness has a lumped qualitative aroma of its own does not at all remove it from the familiar categories of nature. The whole world of our experience is composed of just such *qualia.* The sciences, either directly or indirectly, analyze and explain this world. If there is anything in the quality good which removes it from the possibility of this painstaking and illuminating treatment, it is at any rate nothing which it has in common with ordinary qualities such as yellow. A further *ad hoc* agnosticism with respect to good could be legitimately argued only on the basis of very peculiar

evidence, which, to the best of my knowledge, has never been adduced. Ethical questions may have a poignancy and intimacy which make us here more impatient than usual with our ubiquitous dubiety concerning the precise metaphysical relations of science, experience, and reality, but it is an ungrateful and crippling fallacy to mistake this magnitude of our demands on ethics for an intrinsic and inevitable poverty of its results.

I confess, now, that I find it difficult to suppose that anyone has ever seriously pretended to dispute the definability of the quality good in the senses which I have considered. If no one has, however, it still seems important to discover and announce, therefore, that the program of naturalistic ethics, with its supposition of the scientific "controllability of judgments of value,"[12] has never really been significantly questioned. Meantime, in spite of our much use of the term "scientific," the philosopher need not hurry to surrender this field to the self-confessed natural scientist. The quality yellow is comparatively easy to analyze and define. The quality good is comparatively difficult, not because the good is so obvious, simple, and ineffable a theme, but because it is so evasive, complex, and eloquent.

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## BOOK REVIEWS.

*The New Citizenship.—A Study of American Politics.* SEBA ELDRIDGE. New York: Thomas Y. Crowell Company. 1929. 357 pp.

"Education giveth; Propaganda taketh away. Blessed be Propaganda!" But against King Propaganda Professor Eldridge breaks a lance; and he has other lances for other evils attending the present-day conduct of social affairs. The travesty of our contemporary democratic practice, as described in Riordan's *Plunkitt of Tammany Hall* and Kent's *The Great Game of Politics* must give way, not to such palliations as the contemporary effort to increase voting, the use of the short ballot, or of proportional representation, of the initiative, the referendum, or the recall, but to downright intelligent citizenship. None of the current political remedies are of much value, he thinks, so long as the voter remains incapable of rational decisions.

The public can be made competent and real, rather than "phantom," Mr. Lippmann to the contrary notwithstanding, *if properly*

[12] Cf. John Dewey: "Logical Conditions of a Scientific Treatment of Morality," *Decennial Publications of the University of Chicago.*

*educated.* But, in order to put off his ghostly state and become really competent, the citizen must approach his duties as he would those of a profession. He must learn about society and its ways as a medical student studies the human body. The gist of the author's constructive argument is that the citizen should devote at least two hours daily to his duties as citizen. The achieving of the much-desired competency is to be effected by a deliberate manipulation of the local community; social work and adult education, as now organized, labor under definite handicaps. The crux of the matter of citizenship (by which Professor Eldridge means "the procedure whereby the individual . . . controls his social relationships in cooperation with other parties to the same relationships") lies in "the development of a primary-group organization of the community and the state," that is, in the *local community.* By deliberate intensification of the face-to-face contacts, and of enlightening discussion, competent citizens may be developed. The author suggests that several primary groups in typical American communities in various localities be treated as experiments for five or ten years. The major emphasis should be placed upon group study and discussion of public questions under competent leaders and directors. Public school buildings might be utilized as centres, and either private or public funds might be employed to finance the experiments. If we could contrive the emergence of the competent citizen a new social order would be on the way; along with other evils a coherently-organized self-conscious local community would eliminate the traditional political party. The Greek city-state, coöperative Denmark, and the Communist Party of Russia, as well as the history of the church, are cited by the author as evidence that the suggested experiments are not altogether impracticable. "The contemplated organization of citizens might indeed be conceived as a sort of modern, secular analogue of the church, and even as its possible successor. Could not the vital secular interests of such an organization become as appealing and compulsive?" (p. 332).

But could this intensified culture make all of us competent? He thinks not. Citizenship is a function, or group of functions, for which all adults are naturally no more qualified than they are for any other specific function. Perhaps many of us will be unable to develop competency. The author therefore supplements his plan for the intensification of culture by a suggestion that the suffrage be restricted. Those unable to graduate from a high school scarcely would be capable of competent citizenship, he thinks (p. 311).

One must sympathize with the effort of Professor Eldridge to grapple with a very apparent need. The mutual confidences and understandings of the local face-to-face group were indispensable to

a frontier democracy. We have lost them in the hurly-burly of modern life. But may it not be that our new inventions, such as the telephone, the radio, rapid transportation facilities, and now the television, by their multiplication and intensification of social contacts, will make possible a new and larger type of community as little resembling the cross-roads community as Elizabethan England resembled the Europe of Charlemagne? The modern public is something more than a collection of New England town-meetings. Why, to be more specific, should not functional rather than geographical proximity be the basis upon which to organize the modern "primary group"? Furthermore, might not social science courses in the high schools be made to serve the purpose of providing such minimum competency as might admit to citizenship? Why not experiment there? It scarcely seems advisable to aim at an *omnicompetent* citizen, whatever traditional theory may assume. Even our social experts are not *omni*competent; indeed, no one has time to be.

To the mind of the present writer the question of the *rôle* of the expert, to which Professor Eldridge might have paid more attention, is antecedent to any discussion of an educational program for the citizen. The organization of public health, to use an analogy, involves the education of both the medical profession and the public. One does not need to be a physician in order to keep in good health, but merely to know enough to act upon the best available expert advice. The general public needs similar knowledge in regard to matters of general social significance, rather than expertness, in order to qualify for "citizenship." It is the business of the expert to help make the public, his fellow-citizens, articulate in reference to their matters of common interest by stating concisely what is possible. In specific predicaments he can portray the possible alternative courses of collective action, facilitating by this means the function of reflection, the intelligent selection of policies. The people ought not to be consulted on matters of fact, but on those of desire; and they can desire intelligently only where the possibilities are revealed to them. The expert's business is to reveal social possibilities; the people, by their votes or their representatives' votes, then may select among the possibilities before them the ends at which they wish to aim and the means the use of which they are willing to risk. The problem of democracy involves, consequently, the question of the development at every level of expert opinion, or social science, as well as the question of making it effective. We wish that Professor Eldridge had discussed the training and use of experts as part of his program for democratic citizenship.

*The New Citizenship* is very well written; its emphasis is in a fruitful direction. The appeal to experimentation is most com-

mendable. There is a brief appendix on "The Citizen's Interest in Public Questions" and an adequate index.

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*A History of Science and its Relations with Philosophy and Religion.* WILLIAM CECIL DAMPIER DAMPIER-WHETHAM. Cambridge: Cambridge University Press. 1929. Pp. xxi + 514.

As the title suggests, here is a book designed to meet a long felt need in the English-speaking world. German and French works attempting such an enterprise have long been in existence, but so far as my knowledge goes nothing quite like it has hitherto appeared in English. Histories of science, of philosophy, and of religion we have; portrayals of the conflict between science and religion; also philosophical interpretations of limited epochs or aspects of scientific discovery; but no general history of science considered throughout from the standpoint of philosophical and religious interests. The writings of William Whewell might with some generosity be viewed as filling this function, but it is nearly a century since they appeared and much has happened in a hundred years.

It is obvious that rather rare qualifications are necessary in the author of such a book. On the side of scholarly familiarity with the fields of historical knowledge which his treatment attempts to bring together, Dr. Dampier-Whetham gives few opportunities to any but a meticulous and carping critic; if his interpretation of the history of philosophy follows somewhat stereotyped lines, and his comments on some specific points, such as the pragmatic theory of truth, are open to serious attack, he is but following the lead of many philosophers in the narrower sense of the word and is no more guilty than they. But many readers will almost certainly find themselves raising the question whether the author's method of treatment is such as to render the book as valuable to any definite group of thinkers as they had hoped from the title. This doubt will increase in the latter part of the book. In a typical group of three chapters Dr. Dampier-Whetham outlines first the main developments of nineteenth-century physics, then portrays the progress of biology in the same period, and finally discusses the relations between these achievements and influential philosophic systems. The three themes are thus left in rather disappointing separation, and the really significant interpenetration of scientific and philosophic thinking both in the concrete discoveries on the one hand and the construction of speculative systems on the other is all too meagrely recognized. To the student of philosophy, accordingly, the chapters which deal mainly with his own subject are elementary. While those on scien-

tific discovery are too compressed to be very illuminating; to the student of science the latter chapters will be unnecessary and the former rather externally appended; and outside of these specialists there are probably few readers with sufficient background to work out from these materials a unified view of the history of thought.

There is room and need for a book which will more fully avoid these artificial separations, a book which will discuss the work of a great scientist in the light of all the intellectual forces which have given him his presuppositions and rationalized his method and also of the coming cosmologies into which his results will enter, in short, a truly philosophical history of science rather than a history of science in its relations with philosophy. There is good ground for believing that such a discussion would be highly valuable to many scientists as well as to students of philosophy and the non-professional reader.

But if one be tempted to emphasize such detractions his criticism will be rendered more sympathetic if he asks who would be able to give us this ideal history of science. A few names, a very few, come to mind—all of men so preoccupied with other absorbing tasks that we can hardly anticipate anything of the kind from their hands. And the above criticism does not by any means apply so strongly to Dr. Dampier-Whetham's treatment of ancient and early modern science as to his comments on the more recent period. Few readers with some scientific and philosophical knowledge can not profitably follow him there.

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## NOTES AND NEWS

We regret to announce the death on August 25 in London of Addison W. Moore, professor emeritus of the University of Chicago.

Professor Moore was born in Plainfield, Illinois, July 30, 1866. He received the degree of A.B. at De Pauw University, 1880; of A.M., 1893; and the Ph.D. degree from the University of Chicago in 1898. In 1895 he became assistant in philosophy at the University of Chicago and had been on the teaching staff of that university until his retirement as professor emeritus a year ago.

Professor Moore was the author of *Pragmatism and Its Critics, Existence, Meaning and Reality, Studies in Logical Theory,* and *Creative Intelligence.*

On June 5, 1930, the new Hall of Philosophy of the University of Southern California, presented by Mrs. Seeley Wintersmith Mudd, and Seeley Greenleaf Mudd, was dedicated. The address entitled "The Ideal of a School of Philosophy," was delivered by Professor H. Wildon Carr. The evening meeting consisted of a symposium on "Some Problems of Mass Education" with the following speakers: F. C. S. Schiller, H. B. Alexander, J. E. Boodin, and H. J. Paton.

The School of Philosophy of the University of Southern California will publish in the fall the first two volumes of a new series to be entitled: *Classics in Philosophy.* The aim of the series is to make some of the lesser known but very important classical works of philosophy available to students in English. It is not intended to publish selections, and the translations will reproduce as closely as possible the original form. The first volume is Condillac's *Treatise on the Sensations,* an English translation by Geraldine Carr. The second is Professor Wildon Carr's translation of Leibniz's *Monadology,* with an introduction, commentary, and supplementary essays.